



FCC TEST REPORT

Test report On Behalf of Guangzhou Rigal Electronics Co., Ltd. For LED PROJECTOR Model No.: RD-828, RD-***(* represents the number 0-9, representing different customers, shapes and software versions)

FCC ID: 2AK43RD-828

Prepared for : Guangzhou Rigal Electronics Co., Ltd. Floor 1, Floor 2, Floor 3, Factory Building, NO.30, The north of Hongmiandadao, Xiuquan Street, Huadu District, Guangzhou, China

Prepared By : Shenzhen HUAK Testing Technology Co., Ltd. 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China

 Date of Test:
 Nov. 27, 2020 ~ Dec. 04, 2020

 Date of Report:
 Dec. 04, 2020

 Report Number:
 HK2011233695-E



TEST RESULT CERTIFICATION

| Applicant's name | Guangzhou Rigal Electronics Co., Ltd. |
|----------------------|--|
| Address | Floor 1, Floor 2, Floor 3, Factory Building, NO.30, The north of Hongmiandadao, Xiuquan Street, Huadu District, Guangzhou, China |
| Manufacture's Name: | Guangzhou Rigal Electronics Co., Ltd. |
| Address | Floor 1, Floor 2, Floor 3, Factory Building, NO.30, The north of Hongmiandadao, Xiuquan Street, Huadu District, Guangzhou, China |
| Product description | |
| r rouder description | |
| Trade Mark: | N/A |
| • | |
| Trade Mark: | |

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| Date of Test | |
|-----------------------------------|-------------------------------|
| Date (s) of performance of tests: | Nov. 27, 2020 ~ Dec. 04, 2020 |
| Date of Issue | Dec. 04, 2020 |
| Test Result | Pass |

2

2

Testing Engineer

Goof Dian (Gary Qian) Edan Mu

Technical Manager

Authorized Signatory:

(Eden Hu)

ason Unou

(Jason Zhou)



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** Modifited History **

| Revison | Description | Issued Data | Remark |
|-------------|-----------------------------|---------------|------------|
| Revsion 1.0 | Initial Test Report Release | Dec. 04, 2020 | Jason Zhou |
| | | | |
| | | | |



1. Test Result Summary

1.1. TEST PROCEDURES AND RESULTS

| Requirement | CFR 47 Section | Result |
|-------------------------------------|---------------------|--------|
| Antenna requirement | §15.203/§15.247 (c) | PASS |
| AC Power Line Conducted Emission | §15.207 | PASS |
| Conducted Peak Output Power | §15.247 (b)(3) | PASS |
| 6dB Emission Bandwidth | §15.247 (a)(2) | PASS |
| Power Spectral Density | §15.247 (e) | PASS |
| Band Edge | 1§5.247(d) | PASS |
| Spurious Emission | §15.205/§15.209 | PASS |

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

1.2. TEST FACILITY

Test Firm : Shenzhen HUAK Testing Technology Co., Ltd.

Address 1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China



1.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

| No. | Item | MU |
|-----|-------------------------------|---------|
| 1 | Conducted Emission | ±2.71dB |
| 2 | RF power, conducted | ±0.37dB |
| 3 | Spurious emissions, conducted | ±0.11dB |
| 4 | All emissions, radiated(<1G) | ±3.90dB |
| 5 | All emissions, radiated(>1G) | ±4.28dB |



2. EUT Description

2.1. GENERAL DESCRIPTION OF EUT

| Equipment | LED PROJECTOR |
|---------------------|--|
| Model Name | RD-828 |
| Serial No. | RD-***(* represents the number 0-9, representing differe nt customers, shapes and software versions) |
| Model Difference | All model's the function, software and electric circuit are the same, only model named, customers, shapes and software versions different. Test sample model: RD-828 |
| FCC ID | 2AK43RD-828 |
| Antenna Type | Internal Antenna |
| Antenna Gain | 1dBi |
| Operation frequency | 802.11b/g/n 20:2412~2462 MHz 802.11n 40: 2422~2452MHz |
| Number of Channels | 802.11b/g/n20: 11CH 802.11n 40: 7CH |
| Modulation Type | CCK/OFDM/DBPSK/DAPSK |
| Power Source | AC120V |
| Power Rating | AC120V |



Carrier Frequency of Channels

| Channel List for 802.11b/802.11g/802.11n (HT20) | | | | | | | |
|---|--------------------|---------|--------------------|---------|--------------------|---------|--------------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 01 | 2412 | 04 | 2427 | 07 | 2442 | 10 | 2457 |
| 02 | 2417 | 05 | 2432 | 08 | 2447 | 11 | 2462 |
| 03 | 2422 | 06 | 2437 | 09 | 2452 | | |

| | Channel List For 802.11n (HT40) | | | | | | |
|---------|---------------------------------|---------|--------------------|---------|--------------------|---------|--------------------|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| | | 04 | 2427 | 07 | 2442 | | |
| | | 05 | 2432 | 08 | 2447 | | |
| 03 | 2422 | 06 | 2437 | 09 | 2452 | | |

Note:

In section 15.31(*m*), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

2.2. Operation of EUT during testing

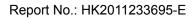
Operating Mode

The mode is used: Transmitting mode for 802.11b/802.11g/802.11n (HT20)

Low Channel: 2412MHz Middle Channel: 2437MHz High Channel: 2462MHz

The mode is used: Transmitting mode for 802.11n (HT40)

Low Channel: 2422MHz Middle Channel: 2437MHz High Channel: 2452MHz





2.3. DESCRIPTION OF TEST SETUP

Operation of EUT during conducted testing and radiation below 1GHz testing:



Operation of EUT during radiation above 1GHz testing:



PC information Model: TP00067A Input: DC20V, 2.25-3.25A Output: 5VDC, 0.5A

The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. The worst case is X&Z position



3. General Information

3.1. Test environment and mode

| Operating Environment: | | |
|--|--|--|
| Temperature: | 25.0 °C | |
| Humidity: | 56 % RH | |
| Atmospheric Pressure: | 1010 mbar | |
| Test Mode: | | |
| Engineering mode: | Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%) | |
| The sample was placed (0.8m below 1GHz, 1.5m above 1GHz) above the ground lane of 3m chamber. Measurements in both horizontal and vertical polarities were | | |

of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. For the full battery state and The output power to the maximum state.

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Pre-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

| Mode | Data rate |
|--------------|-----------|
| 802.11b | 1Mbps |
| 802.11g | 6Mbps |
| 802.11n(H20) | 6.5Mbps |
| 802.11n(H40) | 13.5Mbps |
| | |

Final Test Mode:

| Operation mode: | Keep the EUT in continuous transmitting |
|-----------------|---|
| | with modulation |

1. For WIFI function, the engineering test program was provided and enabled to make EUT continuous transmit/receive.

2.According to ANSI C63.10 standards, the test results are both the "worst case" and "worst setup" 1Mbps for 802.11b, 6Mbps for 802.11g, 6.5Mbps for 802.11n(H20), 13.5Mbps for 802.11(H40). Duty cycle setting during the transmission is 98.5% with maximum power setting for all modulations.



3.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Equipment | Model No. | Serial No. | FCC ID | Trade Name |
|-----------|-----------|------------|--------|------------|
| / | / | / | / | / |

Note:

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
- 3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.



4. Test Results and Measurement Data

4.1. Conducted Emission

Test Specification

| Test Requirement: | FCC Part 15 C Section | 15.207 | | | |
|-------------------|--|-------------------|-------|--|--|
| Test Method: | ANSI C63.10:2013 | | | | |
| Frequency Range: | 150 kHz to 30 MHz | | | | |
| Receiver setup: | RBW=9 kHz, VBW=30 | kHz, Sweep time | =auto | | |
| Limits: | Frequency range (MHz) Limit (dBuV) 0.15-0.5 66 to 56* 56 to 0.5-5 0.5-30 60 50 | | | | |
| Test Setup: | Reference Plane | | | | |
| Test Mode: | Charging + transmitting | g with modulation | | | |
| Test Procedure: | Charging + transmitting with modulation 1. The E.U.T is connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement. | | | | |
| Test Result: | PASS | | | | |



Test Instruments

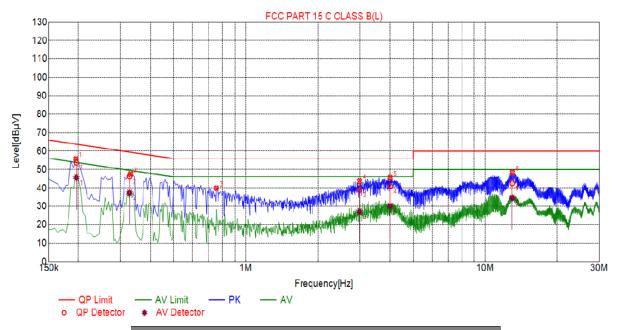
| Conducted Emission Shielding Room Test Site (843) | | | | | | | |
|---|--------------|--------------------|---------------|-----------------|--|--|--|
| Equipment | Manufacturer | Model | Serial Number | Calibration Due | | | |
| Receiver | R&S | ESCI 7 | HKE-010 | Jun. 17, 2021 | | | |
| LISN | R&S | ENV216 | HKE-002 | Jun. 17, 2021 | | | |
| Conducted test software | Tonscend | TS+ Rev 2.5.0.0 | HKE-081 | N/A | | | |

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



TEST RESULTS

Test Specification: Line



| Sus | Suspected List | | | | | | | | | |
|-----|----------------|-----------------|----------------|------------------------|----------------|-------------------|----------|------|--|--|
| NO. | Freq. [MHz] | Level [dBµV] | Factor [dB] | Limit [dBµV] | Margin [dB] | Reading [dBµV] | Detector | Туре | | |
| 1 | 0.1950 | 55.84 | 20.03 | 63.82 | 7.98 | 35.81 | PK | L | | |
| 2 | 0.3300 | 47.48 | 20.04 | 5 9. 4 5 | 11.97 | 27.44 | PK | L | | |
| 3 | 0.7530 | 40.03 | 20.06 | 56.00 | 15.97 | 19.97 | PK | L | | |
| 4 | 2.9850 | 43.67 | 20.22 | 56.00 | 12.33 | 23.45 | PK | L | | |
| 5 | 4.0110 | 45.54 | 20.25 | 56.00 | 10.46 | 25.29 | PK | L | | |
| 6 | 12.9975 | 48.42 | 19.96 | 60.00 | 11.58 | 28.46 | PK | L | | |

| Final | Final Data List | | | | | | | | | | |
|-------|-----------------|--------------------------|-----------------------|-----------------------|----------------------|-------------------------|-----------------------|-----------------------|----------------------|-------------------------|------|
| NO. | Freq. [MHz] | Correction factor[dB] | QP Value [dBµV] | QP Limit [dBµV] | QP Margin [dB] | QP Reading [dBµV] | AV Value [dBµV] | AV Limit [dBµV] | AV Margin [dB] | AV Reading [dBµV] | Туре |
| 1 | 0.1960 | 20.03 | 53.75 | 63.78 | 10.03 | 33.72 | 45.56 | 53.78 | 8.22 | 25.53 | L |
| 2 | 0.3267 | 20.05 | 46.24 | 59.53 | 13.29 | 26.19 | 37.42 | 49.53 | 12.11 | 17.37 | L |
| 3 | 2.9878 | 20.22 | 39.04 | 56.00 | 16.96 | 18.82 | 27.24 | 46.00 | 18.76 | 7.02 | L |
| 4 | 5.1233 | 20.26 | 40.63 | 60.00 | 19.37 | 20.37 | 28.80 | 50.00 | 21.20 | 8.54 | L |
| 5 | 10.3822 | 20.05 | 44.63 | 60.00 | 15.37 | 24.58 | 32.30 | 50.00 | 17.70 | 12.25 | L |
| 4 | 4.0053 | 20.25 | 41.03 | 56.00 | 14.97 | 20.78 | 30.27 | 46.00 | 15.73 | 10.02 | L |
| 5 | 12.9678 | 19.97 | 42.79 | 60.00 | 17.21 | 22.82 | 34.70 | 50.00 | 15.30 | 14.73 | L |

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

Level=Test receiver reading + correction factor

Notes:

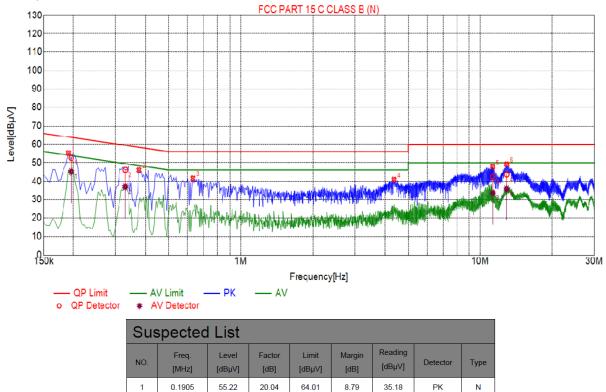
1. An initial pre-scan was performed on the line and neutral lines with peak detector.

2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

3. Final Level =Receiver Read level + LISN Factor + Cable Loss

If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.





Test Specification: Neutral

| Final | Final Data List | | | | | | | | | | |
|-------|-----------------|--------------------------|-----------------------|-----------------------|----------------------|-------------------------|-----------------------|-----------------------|----------------------|-------------------------|------|
| NO. | Freq. [MHz] | Correction factor[dB] | QP Value [dBµV] | QP Limit [dBµV] | QP Margin [dB] | QP Reading [dBµV] | AV Value [dBµV] | A∨ Limit [dBµV] | AV Margin [dB] | AV Reading [dBµV] | Туре |
| 1 | 0.1957 | 20.03 | 52.62 | 63.79 | 11.17 | 32.59 | 45.18 | 53.79 | 8.61 | 25.15 | N |
| 2 | 0.3290 | 20.04 | 46.05 | 59.48 | 13.43 | 26.01 | 36.98 | 49.48 | 12.50 | 16.94 | N |
| 3 | 11.2863 | 20.00 | 42.38 | 60.00 | 17.62 | 22.38 | 33.75 | 50.00 | 16.25 | 13.75 | N |
| 4 | 12.9140 | 19.97 | 43.70 | 60.00 | 16.30 | 23.73 | 35.89 | 50.00 | 14.11 | 15.92 | N |

58.39

56.00

56.00

60.00

60.00

12.47

14.38

15.08

12.14

10.83

25.87

21.57

20.67

27.86

29.20

ΡK

ΡK

ΡK

ΡK

ΡK

Ν

Ν

N

Ν

Ν

Remark: Margin = Limit – Level

Correction factor = Cable lose + LISN insertion loss

2

3

4

5

6

0.3750

0.6315

4.3665

11.2830

12.9165

45.92

41.62

40.92

47.86

49.17

20.05

20.05

20.25

20.00

19.97

Level=Test receiver reading + correction factor

Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.

2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

3. Final Level =Receiver Read level + LISN Factor + Cable Loss.

If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.



4.2. Maximum Conducted Output Power

Test Specification

| Test Requirement: | FCC Part 15 C Section 15.247 (b)(3) | | | | | |
|-------------------|---|--|--|--|--|--|
| Test Method: | KDB 558074 | | | | | |
| Limit: | 30dBm | | | | | |
| Test Setup: | Power meter EUT | | | | | |
| | Power meter EUT | | | | | |
| Test Mode: | Transmitting mode with modulation | | | | | |
| Test Procedure: | The testing follows the Measurement Procedure of FCC KDB No.558074 D01 15.247 Meas Guidance v05r02. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Measure the Peak output power and record the results in the test report. | | | | | |
| Test Result: | PASS | | | | | |

Test Instruments

| RF Test Room | | | | | | | |
|------------------------------|--------------|----------|---------------|-----------------|--|--|--|
| Equipment | Manufacturer | Model | Serial Number | Calibration Due | | | |
| Power meter | Agilent | E4417B | HKE-107 | Jun. 17, 2021 | | | |
| Power Sensor | Agilent | E9327A | HKE-113 | Jun. 17, 2021 | | | |
| RF cable | Times | 1-40G | HKE-034 | Jun. 17, 2021 | | | |
| RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Jun. 17, 2021 | | | |

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Test Data

| | TX 802.11b Mode | | | | | | | |
|---------|-----------------|-------------------------------------|-------|--|--|--|--|--|
| Test | Frequency | Maximum Peak Conducted Output Power | LIMIT | | | | | |
| Channel | (MHz) | (dBm) | dBm | | | | | |
| CH01 | 2412 | 20.16 | 30 | | | | | |
| CH06 | 2437 | 20.83 | 30 | | | | | |
| CH11 | 2462 | 20.57 | 30 | | | | | |
| | TX 802.11g Mode | | | | | | | |
| CH01 | 2412 | 20.79 | 30 | | | | | |
| CH06 | 2437 | 21.09 | 30 | | | | | |
| CH11 | 2462 | 20.82 | 30 | | | | | |
| | | TX 802.11n20 Mode | | | | | | |
| CH01 | 2412 | 20.97 | 30 | | | | | |
| CH06 | 2437 | 20.86 | 30 | | | | | |
| CH11 | 2462 | 20.66 | 30 | | | | | |
| | | TX 802.11n40 Mode | | | | | | |
| CH03 | 2422 | 20.89 | 30 | | | | | |
| CH06 | 2437 | 20.46 | 30 | | | | | |
| CH09 | 2452 | 20.8 | 30 | | | | | |



4.3. Emission Bandwidth

Test Specification

| Test Requirement: | FCC Part 15 C Section 15.247 (a)(2) | | | | |
|-------------------|--|--|--|--|--|
| Test Method: | KDB 558074 | | | | |
| Limit: | >500kHz | | | | |
| Test Setup: | Spectrum Analyzer | | | | |
| Test Mode: | Transmitting mode with modulation | | | | |
| Test Procedure: | The testing follows FCC KDB Publication No.558074 D01 15.247 Meas Guidance v05r02. Set to the maximum power setting and enable the EUT transmit continuously. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. Measure and record the results in the test report. | | | | |
| Test Result: | PASS | | | | |

Test Instruments

| RF Test Room | | | | | | | | |
|------------------------------|--------------|----------|---------------|-----------------|--|--|--|--|
| Equipment | Manufacturer | Model | Serial Number | Calibration Due | | | | |
| Spectrum analyzer | Agilent | N9020A | HKE-048 | Jun. 17, 2021 | | | | |
| RF Cable (9KHz-26.5GHz) | Tonscend | 170660 | N/A | Jun. 17, 2021 | | | | |
| RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Jun. 17, 2021 | | | | |

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Test data

| Test channel | 6dB Emission Bandwidth (MHz) | | | | | | |
|--------------|------------------------------|---------|--------------|--------------|--|--|--|
| iest channel | 802.11b | 802.11g | 802.11n(H20) | 802.11n(H40) | | | |
| Lowest | 9.604 | 16.36 | 17.07 | 34.86 | | | |
| Middle | 10.06 | 16.41 | 17.15 | 35.22 | | | |
| Highest | 9.156 | 16.38 | 17.20 | 35.77 | | | |
| Limit: | >500KHZ | | | | | | |
| Test Result: | | P/ | ASS | | | | |

Test plots as follows:



802.11b Modulation

Lowest channel



Middle channel







802.11g Modulation

Lowest channel

| | 2.412000000 C | Hz 1FGain:Low | Center F | | | 1/1 | Radio Sto | | Frequency |
|--|-------------------------------------|------------------|----------|---|------------|-------|------------------|----------------------------------|----------------------------|
| 10 dB/div | Ref Offset 8.64 dB Ref 18.64 dBm | | | | | N | lkr1 2.4 4.68 | 417 GHz 865 dBm | |
| 8.64 -1.36 | | aludan | www. | y was not | 1 hokep | | | | Center Fr 2.412000000 G |
| -11.4 21.4 | marina | | | | | A Mar | honturney | Wellow A. J. | |
| 41.4 4. (A. (A. (A. (A. (A. (A. (A. (A. (A. (A | | | | | | | | Interference | |
| 71.4 Center 2.412 | GH ² | | | | | | Sn | an 40 MHz | |
| #Res BW 100 | | | #VE | 3W 300 kHz | ź | | Sweep | 3.867 ms | CF St 4.000000 M |
| Occupied | d Bandwidth | | | Total Pow | /er | 22.5 | ō dBm | | Auto M |
| | 16. | 427 M | Hz | | | | | | Freq Offs |
| Transmit F | Freq Error | -1.859 | kHz | OBW Pow | ver | 99 | 9.00 % | | 0 |
| x dB Band | lwidth | 16.36 | MHz | x dB | | -6. | 00 dB | | |
| 150 | | | | | | STATU | | | |

Middle channel

| RL RF 50.2 AC enter Freq 2.43700000 | OGHz Cente | r Freq: 2.437000000 GHz ree Run Avg Hol 1: 20 dB | Radio 4: 1/1 | 06 PMNov 30, 2020 Std: None Device: BTS | Frequency |
|--|----------------------------|--|-----------------|---|----------------------------------|
| Ref Offset 8.64 d dB/div Ref 18.64 dB | | | Mkr1 2.4 4. | 4076 GHz 4539 dBm | |
| 64 36 | pro wanter and | 1 my www | * | | Center Fre 2.437000000 GH |
| 14 14 14 14 | | | mound | Alinyuuuhiin | |
| enter 2.437 GHz | | | | pan 40 MHz | 05.04 |
| Res BW 100 kHz | | VBW 300 kHz | | p 3.867 ms | CF Ste 4.000000 MH Auto Ma |
| Occupied Bandwid | th 6.444 MHz | Total Power | 22.7 dBm | | Freq Offs |
| Transmit Freq Error | -12.249 kHz | OBW Power | 99.00 % | | 01 |
| x dB Bandwidth | 16.41 MHz | x dB | -6.00 dB | | |





802.11n (HT20) Modulation

Lowest channel

| Center Freq 2.41200000 | 0 GHz | Center Freq: 2.412 Trig: Free Run #Atten: 20 dB | | 1/1 | Radio Std | | Frequ | ency |
|---|-----------------|---|--------------------|--------|--------------|----------------------|----------------|--------------------|
| Ref Offset 8.64 10 dB/div Ref 18.64 dE | | | | Mkr | | 48 GHz 32 dBm | | |
| Log 8.64 | hadradaad | artaulay ananad | 1 Mar Marilanda | | | | Cen 2.41200 | ter Fre 0000 GH |
| -21.4 -21.4 -31.4 -33.4 margle poply to della for both | / | | | 1 | hanna | munn | | |
| -41.4 -51.4 -51.4 | | | | | | | | |
| Center 2.412 GHz #Res BW 100 kHz | | #VBW 300 |) kHz | | Spa Sweep | n 40 MHz 3.867 ms | | CF Ste |
| Occupied Bandwid | ith 7.510 MH | | Power | 22.9 | dBm | | Auto | Ma |
| ہ Transmit Freq Error | 886 | | Power | 99 | .00 % | | Fre | q Offse 0 H |
| x dB Bandwidth | 17.07 M | Hz xdB | | -6.0 | 00 dB | | | |
| ISG | | | | STATUS | | | | |

Middle channel

| glient Spectrum Analyzer - Occupied BW | | SENSE:INT | ALIONALITO 0 | 2:14:40 PMNov 30, 2020 | |
|--|---------------------|-------------------------|---------------|----------------------------------|------------------------------|
| enter Freq 2.437000000 | Trig: F | r Freg: 2.437000000 GHz | Ra 14: 1/1 | dio Std: None dio Device: BTS | Frequency |
| Ref Offset 8.64 dB 0 dB/div Ref 18.64 dBm | | | Mkr1 | 2.43952 GHz 4.4220 dBm | |
| og 1.64 | partrastrastratives | mpur harrow har | h | | Center Fre 2.437000000 GH |
| and and a start with a start wi | | | An House | aller and a filler | |
| 1.4 1.4 1.4 | | | | | |
| enter 2.437 GHz Res BW 100 kHz | : | VBW 300 kHz | Si | Span 40 MHz weep 3.867 ms | CF Ste 4.000000 Mi |
| Occupied Bandwidth | 539 MHz | Total Power | 22.8 dl | Bm | Auto M Freq Offs |
| Transmit Freq Error | -8.758 kHz | OBW Power | 99.00 | 0 % | 01 |
| x dB Bandwidth | 17.15 MHz | x dB | -6.00 | dB | |
| | | | | | |





802.11n (HT40) Modulation

| Center Fin Center Center Fin Center Fin | | eq 2.422000000 G | Hz | Center F Trig: Free Matten: 20 | req: 2.422000 e Run | 000 GHz AvgjHold: 1 | | Radio Std | None | Fr | equency |
|---|-------------------------|-------------------------------------|-------------------|--------------------------------------|------------------------|------------------------|------|-----------------|------------------|------|------------------|
| Center 2.422 GH2 Res BW 100 kH2 Transmit Freq Error -1.819 kH2 OBW Power 99.00 % | 10 dB/div | Ref Offset 8.64 dB Ref 18.64 dBm | | | | | Mk | r1 2.43 1.07 | 32 GHz 68 dBm | | |
| 214 314 314 314 314 314 314 314 3 | 8.64 •1.36 | | للمسمعانه والعالم | horselling | and a star | newebroat-helo | | | | - | |
| Center 2.422 GH2 Res BW 100 kH2 Sweep 7.667 ms Occupied Bandwidth Total Power 21.8 dBm 35.795 MHz Transmit Freq Error -1.819 kH2 OBW Power 99.00 % | 21.4 31.4 41.4 AM | Janahan passol | | | | | L. | hthere | (lilling), pure | | |
| #Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms CCFStill Occupied Bandwidth Total Power 21.8 dBm Auto M 35.795 MHz Freq Offs Freq Offs Freq Offs 0 | -51.4 | | | | | | | | | | |
| Occupied Bandwidth Total Power 21.8 dBm 35.795 MHz Freq Offs Transmit Freq Error -1.819 kHz | | | | #VE | 3W 300 kH | łz | | | | 8 | CF Ste |
| | Occup | | 795 MI | Ηz | Total Po | wer | 21.8 | dBm | | Auto | Ma Freq Offse |
| | | | | | | wer | | | | | 01 |
| | | | | | | | | | | | |

Lowest channel

Middle channel

| glient Spectrum Analyzer - Occupied I | 3W | SENSE:INT | | LIGNAUTO | 02.24.15.5 | MNov 30, 2020 | |
|---|---|---------------------------------------|-----------|----------|--|----------------------|-----------|
| Span 80.000 MHz | | Center Freq: 2.4370 Trig: Free Run | | | Radio Std | | Span |
| | /1FGain:Low | Atten: 20 dB | Angli Ma | 10110 | Radio De | vice: BTS | Spa |
| Ref Offset 8.64 d 0 dB/div Ref 18.64 dBr | | | | Mkr | | 328 GHz 57 dBm | 80.000 MH |
| 8.64 | | | 1 | | | | |
| 1.36 | p. f. f. b. | helselyn pailantel | and dated | - | | | |
| 21.4 | | | | | | | Full Spa |
| 1.4 Martin and a start and a start | | | | 444 | n an | MANANA | , an ope |
| 1.4 | | | | | | | |
| 1,4 | + | | | | | | |
| enter 2.437 GHz Res BW 100 kHz | | #VBW 300 | kHz | | Spa Sweep | n 80 MHz 7.667 ms | |
| Occupied Bandwidt | th | Total | | 21.5 | ō dBm | | Last Spa |
| | 5.823 MH | z | | | | | |
| Transmit Freq Error | -2.255 k | Hz OBW | Power | 99 | 9.00 % | | |
| x dB Bandwidth | 35.22 M | Hz xdB | | -6. | 00 dB | | |
| | | | | | | | |
| a l | | | | STATU | | | |
| 9 | | | | STATU | 2 | | |

| If Called w IAtion: 20 dB Radio Device: BTS 0 dB/div Ref Offset: 8.64 dB Mkri 2.43576 GHz 80.00 0 dB/div Ref 18.64 dBm 0.51418 dBm Fill 14 1 1 1 Fill Fill 14 1 | RL RF 50 Q AC | Cente | r Freq: 2.452000000 GHz ree Run Avg[Hold | ALIGNAUTO [02:37:04 PMNov Radio Std: Nor : 10/10 | |
|---|---------------------------------------|--------------------------------|--|--|----------------|
| Dallativ Ref 18.64 dBm 0.51418 dBm 0 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 14 1 1 1 1 15 1 1 1 1 14 1 1 1 1 14 1 1 1 1 14 1 1 1 1 1 15 1 1 1 1 1 14 1 1 1 1 1 1 15 1 1 1 1 1 1 15 < | | | : 20 dB | | BTS Spa |
| Image: Section of the section of t | dB/div Ref 18.64 dB | iB m | | | |
| enter 2.452 GH2 Res BW 100 kHz #VBW 300 kHz Sweep 7.667 ms Occupied Bandwidth Total Power 21.7 dBm 35.848 MHz Transmit Freq Error -14.459 kHz OBW Power 99.00 % | 36 | 1 1. leitos televen interes | a yadah kareka angala kata sa karaka kar | λ | |
| enter 2.452 GH2 tes BW 100 kHz Sweep 7.667 ms Occupied Bandwidth Total Power 21.7 dBm 35.848 MHz Transmit Freq Error -14.459 kHz OBW Power 99.00 % | a 4 your mahin baatai dan badan da | | | MAR Helson & MAN | Full Spa |
| Occupied Bandwidth Total Power 21.7 dBm 35.848 MHz Transmit Freq Error -14.459 kHz OBW Power 99.00 % | enter 2.452 GHz | | | | |
| 35.848 MHz Transmit Freq Error -14.459 kHz OBW Power 99.00 % | Res BW 100 kHz | # | VBW 300 kHz | Sweep 7.6 | 67 ms Last Spa |
| | | | Total Power | 21.7 dBm | |
| x dB Bandwidth 35.77 MHz x dB -6.00 dB | Transmit Freq Error | -14.459 kHz | OBW Power | 99.00 % | |
| | x dB Bandwidth | 35.77 MHz | x dB | -6.00 dB | |



4.4. Power Spectral Density

Test Specification

| Test Requirement: | FCC Part 15 C Section 15.247 (e) | | | | | |
|-------------------|--|--|--|--|--|--|
| Test Method: | KDB 558074 | | | | | |
| Limit: | The average power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission. | | | | | |
| Test Setup: | Speetrum Analyzer | | | | | |
| Test Mode: | Transmitting mode with modulation | | | | | |
| Test Procedure: | The testing follows Measurement procedure 10.2 method PKPSD of FCC KDB Publication No.558074 D01 15.247 Meas Guidance v05r02 The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. Set the span to at least 1.5 times the OBW. Detector = Peak, Sweep time = auto couple. Employ trace averaging (Peak) mode over a minimum of 100 traces. Use the peak marker function to determine the maximum power level. Measure and record the results in the test report. | | | | | |
| Test Result: | PASS | | | | | |

Test Instruments

| | RF Test Room | | | | | | | | | |
|------------------------------|--------------|----------|---------------|-----------------|--|--|--|--|--|--|
| Equipment | Manufacturer | Model | Serial Number | Calibration Due | | | | | | |
| Spectrum analyzer | Agilent | N9020A | HKE-048 | Jun. 17, 2021 | | | | | | |
| RF Cable (9KHz-26.5GHz) | Tonscend | 170660 | N/A | Jun. 17, 2021 | | | | | | |
| RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Jun. 17, 2021 | | | | | | |

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Test data

| EUT Set Mode | Channel | Result (dBm/30kHz) | Result (dBm/3kHz) | | | | |
|--|-------------------|--------------------|-------------------|--|--|--|--|
| | Lowest | 3 | -7 | | | | |
| 802.11b | Middle | 5.67 | -4.33 | | | | |
| | Highest | 3.84 | -6.16 | | | | |
| | Lowest | -0.05 | -10.05 | | | | |
| 802.11g | Middle | 0.8 | -9.2 | | | | |
| | Highest | 0.09 | -9.91 | | | | |
| | Lowest | -0.5 | -10.5 | | | | |
| 802.11n(H20) | Middle | -0.27 | -10.27 | | | | |
| | Highest | -0.69 | -10.69 | | | | |
| | Lowest | -3.98 | -13.98 | | | | |
| 802.11n(H40) | Middle | -5.14 | -15.14 | | | | |
| Highest -4.58 -14.58 | | | | | | | |
| PSD test result (dBm/3kHz)= PSD test result (dBm/30kHz)-10 | | | | | | | |
| Limit: 8dBm/3kHz | | | | | | | |
| Test Result: | Test Result: PASS | | | | | | |

Test plots as follows:



802.11b Modulation

Lowest channel



Middle channel





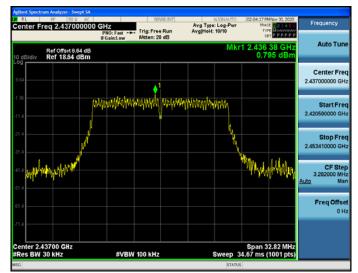


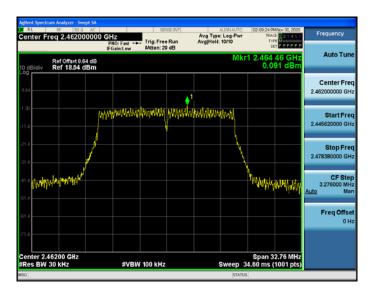
802.11g Modulation

Frequency RL RF 50 Q AC Center Freq 2.412000000 GHz Avg Type: Log-Pwr Avg[Hold: 10/10 Trig: Free Run Auto Tur .414 49 -0.045 d Ref Offset 8.64 dB Ref 18.64 dBm Center Freq 2.412000000 GHz ٢ Www.hu Start Fre 2.395640000 GH h Wile 117 Stop Free 2.428360000 GHz Which the the CF Ste 3.272000 MH lwww. M Auto Freq Offs 0 H Center 2.41200 GHz #Res BW 30 kHz Span 32.72 MHz Sweep 34.53 ms (1001 pts) #VBW 100 kHz

Lowest channel

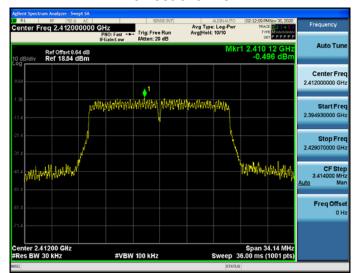
Middle channel







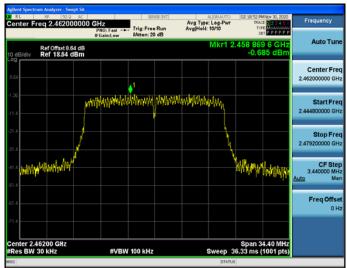
802.11n (HT20) Modulation



Lowest channel

Middle channel







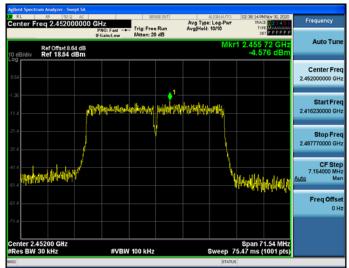
802.11n (HT40) Modulation



Lowest channel

Middle channel







4.5. Conducted Band Edge and Spurious Emission Measurement

Test Specification

| Test Requirement: | FCC Part15 C Section 15.247 (d) |
|-------------------|--|
| Test Method: | KDB558074 |
| Limit: | In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). |
| Test Setup: | Spectrum Analyzer |
| Test Mode: | Transmitting mode with modulation |
| Test Procedure: | The testing follows FCC KDB Publication No.558074 D01 15.247 Meas Guidance v05r02. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. Set to the maximum power setting and enable the EUT transmit continuously. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d). Measure and record the results in the test report. The RF fundamental frequency should be excluded against the limit line in the operating frequency band. |
| Test Result: | PASS |



Test Instruments

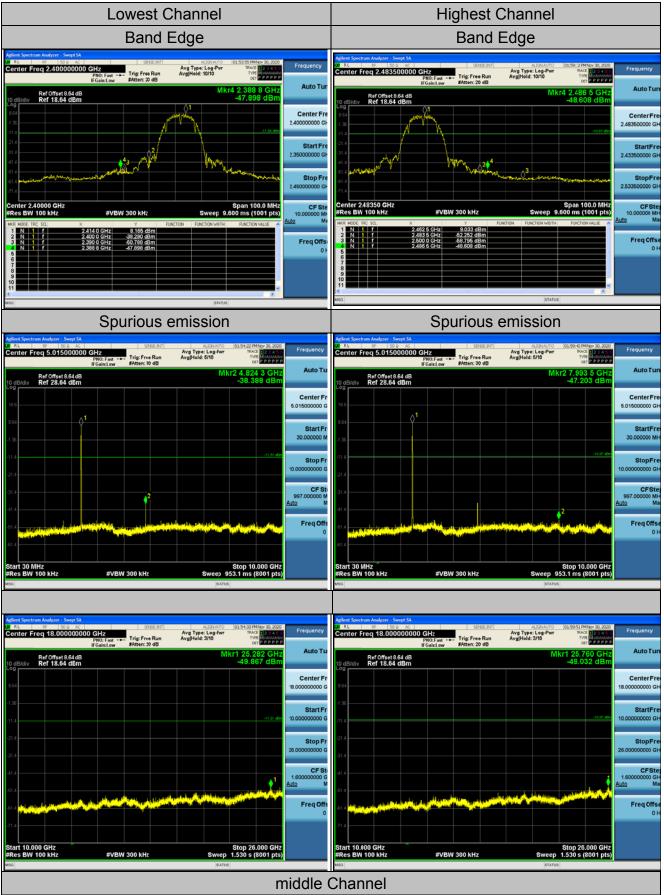
| | RF Test Room | | | | | | | | | |
|----------------------------|--------------|----------|---------------|-----------------|--|--|--|--|--|--|
| Equipment | Manufacturer | Model | Serial Number | Calibration Due | | | | | | |
| Spectrum analyzer | Agilent | N9020A | HKE-048 | Jun. 17, 2021 | | | | | | |
| Signal generator | Agilent | N5183A | HKE-071 | Jun. 17, 2021 | | | | | | |
| RF Cable (9KHz-26.5GHz) | Tonscend | 170660 | N/A | Jun. 17, 2021 | | | | | | |
| RF automatic control unit | Tonscend | JS0806-2 | HKE-060 | Jun. 17, 2021 | | | | | | |

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Test Data

802.11b Modulation

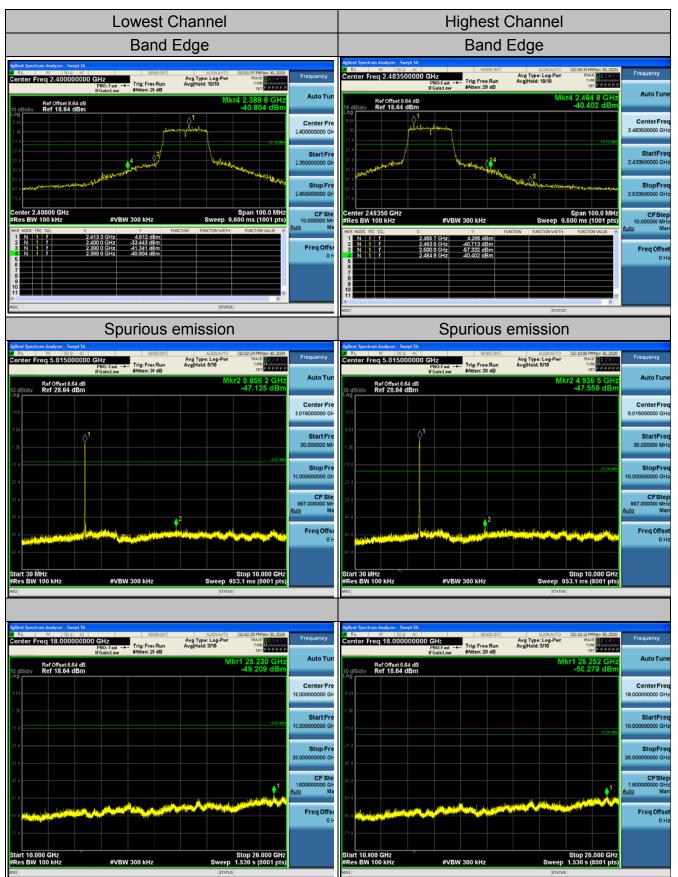




| Spurious emission | | | | | | | | | | | | |
|--|---------|--|--|--|---|--|--|--|---|------------------------|--|--|
| Aglent Spectrum Analyzer - Swept 30 g RL RF 50 g M | 000 GHz | SINSE:INT Trig: Free Run #Atten: 30 dB | ALISNAATO Avg Type: Log-fwr Avg Hold: 5/10 | 01:56:51 PMNov 30, 2020 TRACE 2 2 3 4 5 6 TVPE MUNICIPAL DET P.P.P.P.P.P.P.P. | Frequency | Aglient Spectrum Analyzer - Swept SA RL RF S0 2 AC Center Freq 18.00000000 | O GHz PN0:Fast →→ IFGalicLow #Atten: 20 dB | Avg Type: Log-Pwr | 2 PMNov 30, 2020 RACE 11 2 3 4 5 5 TYPE MULTINE Freque CET P.P.P.P.P.P.P | | | |
| Ref Offset 8.64 c 10 dB/div Ref 28.64 dB | HB m | | Mk | r2 7.490 1 GHz -47.512 dBm | Auto Tu | Ref Offset 8.64 dB 10 dB/div Ref 18.64 dBm | | Mkr1 24 -49 | .692 GHz Aut .646 dBm | ito Tun | | |
| 18.6 | .1 | | | | Center Fr 5.015000000 G | 8.64 | | | Cent 18.000000 | nterFre 0000 GH | | |
| -1.36 | ¢. | | | | Start Fr 30.000000 M | -1.36 | | | Sta 10.000000 | tartFre 0000 GH | | |
| -11.4 | | | | -11.19 d)e | Stop Fr 10.000000000 G | -21.4 | | | Sto 26.000000 | topFre 0000 GH | | |
| -41.4 | | | | | CF Sto 997.000000 M <u>Auto</u> M | -41.4 | | land attention of the | 1.600000 Auto | CFSte 0000 GH Ma | | |
| | | a taylari bartari con t | | فتهاله وتستحت المجاولاتها | Freq Offs 0 | | المتنجن والمناجر والمتعادين | in the state of the second | | eq Offse 0 H | | |
| Start 30 MHz | | | | Stop 10.000 GHz | | Start 10.000 GHz | | Stop | 26.000 GHz | | | |
| #Res BW 100 kHz | #VBW 3 | 00 kHz | Sweep 9 | 53.1 ms (8001 pts) | | #Res BW 100 kHz | #VBW 300 kHz | Sweep 1.530 STATUS | s (8001 pts) | | | |



802.11g Modulation

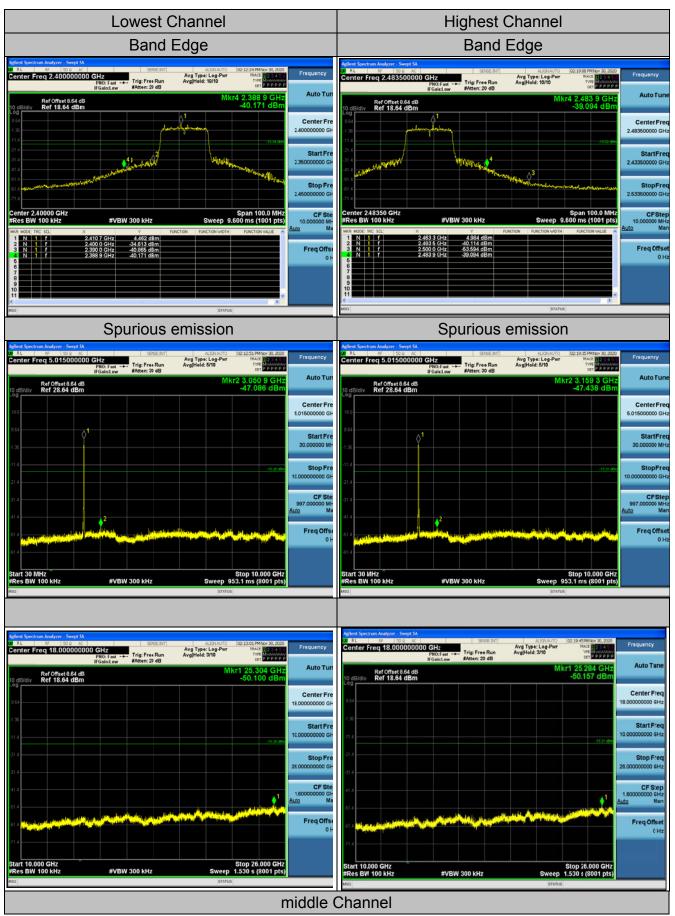




| middle Channel | | | | | | | | | | | |
|--|--|------------------------------------|--|-------------------------------|--|--|--|--|--|--|--|
| | Sp | ourious | emission | | | | | | | | |
| Agilent Spectrum Analyzer - Swept SA Ø/ RL 8F (50 ⊊ AC SBISE:0/1] Center Freg 5.015000000 GHz | ALIGN AUTO 02:04:44 PM Nov 30, 2020 Avg Type: Log-Pwr TRACE 07 PM | Frequency | | Frequency | | | | | | | |
| PHO: Fast Trig: Free Run IFGain:Low #Atten: 30 dB Ref Onset 9:64 dB 10 dB/div Ref 28:64 dBm | Avg Hold: 5/10 TVPE CT P P P P P OCT P P P P P Mkr2 2.987 4 GHz -46,205 dBm | Auto Tun | Control reg Togo Free Run If Galat.tow Avg Heid: 3/10 Togo Free Run Branch Avg Heid: 3/10 Togo Free Run Run Avg Heid: 3/10 Avg Heid: 3/10< | Auto Tun | | | | | | | |
| | | Center Fre 5.015000000 GH | | CenterFre | | | | | | | |
| 1.35 1 | | Start Fre 30.000000 MH | 11.0 | StartFr 000000000 Gi | | | | | | | |
| 21.4 | -1565-059 | Stop Fre 10.000000000 GH | -21.4 | StopFre | | | | | | | |
| 31.4 | | CF Ste 997.000000 MH Auto Ma | Auto | CFSte 600000000 GI 2 Mi | | | | | | | |
| | an side of the set of the set of the set of the set | Freq Offse 0 H | | Freq Offs 0 H | | | | | | | |
| Start 30 MHz | Stop 10.000 GHz | | 31.4 Start 10.000 GHz Stop 26.000 GHz | | | | | | | | |
| #Res BW 100 kHz #VBW 300 kHz | Sweep 953.1 ms (8001 pts) | | #Res BW 100 kHz #VBW 300 kHz Sweep 1.530 s (8001 pts) MSG | | | | | | | | |



802.11n (HT20) Modulation

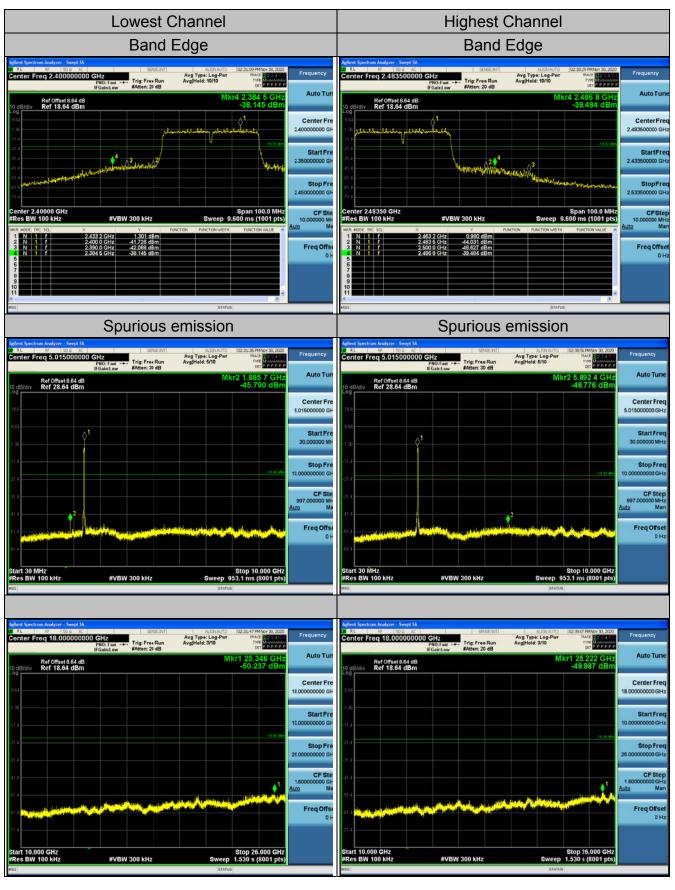




| | | | | Sp | ourious | s emission |
|---|----------------------|--|--|--|---------------------------------|---|
| Agilent Spectrum Analyzer - Swept SA 0. RL RF 50 2 AC Center Freq 5.015000000 | | SEMSE:3VT Avg 1 ree Run Avg H :30 dB | ALIGNAUTO Type: Log-Pwr fold: 5/10 | 02:16:21 PMNov 30, 2020 TRACE 22:04 9 0 TYPE M | Frequency | Agtient Spectrum Analyzer - Swept SA. Strott Strift Autonu/TO Oc. 369 Millor 30, 2000 Of RL MF 30 G AC Strott Strift Autonu/TO Oc. 369 Millor 30, 2000 Centor Freq 18,000000000 GHz PRof. taxt Trig: Free Run Avg Type: Log-Pwr Millor 310 Trig: Stree Run Figure 1 Free Run Avg Type: Log-Pwr Trig: Free Run Avg Type: Log-Pwr Trig: Free Run |
| Ref Offset 8.64 dB | | | Mkr | 2 6.075 6 GHz -46.599 dBm | Auto Tu | Ref Offset 8.64 dB WIKT 20.724 GH2 10 dB/div Ref 18.64 dBm -49.937 dBm |
| 19.6 | | | | | Center Fr 5.015000000 G | |
| 1.36 1 | | | | | Start Fr 30.000000 M | 1.30 Start Free 11.4 |
| 21.4 | | | | -15.15 dbm | Stop Fr 10.000000000 G | r 21.6 Stop Free 31.4 28.00000000 GH |
| 41.4 | | 2 | | | CF St 997.000000 M Auto M | 4 1.6000000 GH |
| -51.4 | with the strength of | part and a second | alita di kaja pres | يا الأربي الحريك الي | Freq Offe 0 | SIA SIA Harris A database of the database of |
| 61.4 Start 30 MHz #Res BW 100 kHz | #VBW 300 kH | | Sweep 05 | Stop 10.000 GHz i3.1 ms (8001 pts) | | Start 10.000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.530 s (8001 pts) |
| INSC | #VBW 300 KH | 12 | Sweep 95 | 5.1 ms (8001 pts) | | #Res BW 100 km2 #VBW 300 km2 SWeep 1,330 s (8001 pts) Mso [status] |



802.11n (HT40) Modulation



middle Channel



| | | | Spurious | emission | | |
|--|--|---|---|--|--|--------------------------------------|
| Agilent.Spectrum Analyzer - Swept SA 07 RL RF 50 R AC Center Freq 5.015000000 GH P IFI | IZ NO: Fast →→ Sense: NO: Fast →→ #Atten: 30 dB | ALIGNAUTO 02:35:51 PMNov Avg Type: Log-Pwr Avg]Hold: 5/10 TYPE Ger | Frequency | Agtent Spectrum Analyzer - Swept SA 00 R.L 87 S0 - AC Center Freq 18.00000000 GHz Avg IFGalctor SAtter: 20 B | ALIGNAUTO 02:36:02 PMNov 30, 2020 Type: Log-Pwr TRACE 0 0 1 Hold: 2/10 Type 0 0 1 0 0 0 0 0 0 | Frequency |
| Ref Offset 8.64 dB | | Mkr2 2.622 2 -47.057 | | Ref Offset 8.64 dB 10 dB/div Ref 18.64 dBm | Mkr1 25.248 GHz -49.158 dBm | Auto Tune |
| 18.6 | | | Center Fre 5.015000000 GH | 864 | | Center Freq 18.000000000 GHz |
| 1.36 1 | | | Start Fre 30.000000 MH | -1.26 | | Start Freq 10.00000000 GHz |
| 21.4 | | | Stop Fre 10.000000000 GH | 31.4 | | Stop Freq 26.00000000 GHz |
| 41.4 | | | CF Ste 997.000000 MH <u>Auto</u> Ma | 41.4 | | CF Step 1.60000000 GHz uto Man |
| 51.4 61.4 | and you wanted the standard of the | tering along participating and a participation of | Freq Offse 0 H | as a strategie produce that is reflected with the strategie as second with the strategies as sec | | Freq Offset 0 Hz |
| Start 30 MHz #Res BW 100 kHz | #VBW 300 kHz | Stop 10.00 Sweep 953.1 ms (800 | 0 GHz 11 pts) | Start 10.000 GHz #Res BW 100 kHz #VBW 300 kHz 550 | Stop 26.000 GHz Sweep 1.530 s (8001 pts) | |

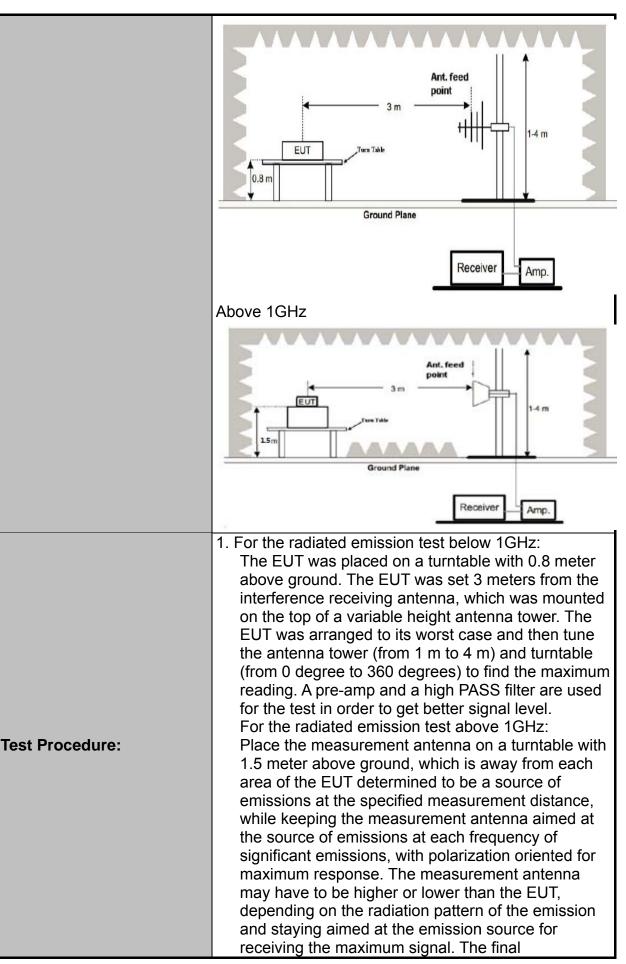


4.6. Radiated Spurious Emission Measurement

Test Specification

| Test Method: Frequency Range: Measurement Distance: | ANSI C63.10 9 kHz to 25 0 3 m | | | | | | | | | | |
|---|---|----------------------|----------------------------|----------|-----------------------------|------------------|---------------------------------|--|--|--|--|
| <u> </u> | | GHz | | | ANSI C63.10: 2013 | | | | | | |
| Measurement Distance: | 3 m | | | | | | | | | | |
| | | | | | | | | | | | |
| Antenna Polarization: | Horizontal & | Vertical | | | | | | | | | |
| Operation mode: | Transmitting | mode w | ith mod | ulati | on | | | | | | |
| | Frequency | | Detector RB\ | | VBW | | Remark | | | | |
| Receiver Setup: | <u>9kHz- 150kHz</u> 150kHz- 30MHz | Quasi-pe Quasi-pe | | | 1kHz 30kHz | | si-peak Value si-peak Value | | | | |
| • | 30MHz-1GHz | Quasi-pe | ak 120K | Hz | 300KHz | Quas | si-peak Value | | | | |
| | Above 1GHz | Peak | 1MF | | 3MHz | | eak Value | | | | |
| | | Peak | 1MF | Ιz | 10Hz | Ave | erage Value | | | | |
| | Frequency | | Field Stre (microvolts/ | | - | | Measurement istance (meters) | | | | |
| | 0.009-0.4 | | 2400/F(KHz) | | 300 | | | | | | |
| | 0.490-1.7 | 24000/F(KHz) | | 30 30 | | | | | | | |
| | 1.705-3 30-88 | | 30 100 | | 3 | | | | | | |
| | 88-216 | | 150 | | | 3 | | | | | |
| Limit: | 216-96 | | 200 | | | 3 | | | | | |
| | Above 9 | | 500 3 | | | 3 | | | | | |
| | Frequency | | eld Streng rovolts/me | | Measure Distan (meter | се | Detector | | | | |
| | Above 1GHz | , | 500 | | 3 | | Average | | | | |
| | | - | 5000 | | 3 | | Peak | | | | |
| | For radiated | emissio | ns belov | v 30 | MHz | | | | | | |
| Test setup: | 30MHz to 10 | G | - 3 m | | RX Anter |) ↑ ↓ ↓ | | | | | |







| | measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=120 kHz for f < 1 GHz; VBW ≥RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f = 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. |
|---------------|---|
| Test results: | PASS |



Test Instruments

| | Radiated Em | nission Test Si | ite (966) | |
|-------------------------|--------------|--------------------|------------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| Receiver | R&S | ESCI-7 | HKE-010 | Jun. 17, 2021 |
| Spectrum analyzer | Agilent | N9020A | HKE-048 | Jun. 17, 2021 |
| Preamplifier | EMCI | EMC051845 SE | HKE-015 | Jun. 17, 2021 |
| Preamplifier | Agilent | 83051A | HKE-016 | Jun. 17, 2021 |
| Loop antenna | Schwarzbeck | FMZB 1519 B | HKE-014 | Jun. 17, 2021 |
| Broadband antenna | Schwarzbeck | VULB 9163 | HKE-012 | Jun. 17, 2021 |
| Horn antenna | Schwarzbeck | 9120D | HKE-013 | Jun. 17, 2021 |
| Antenna Mast | Keleto | CC-A-4M | N/A | N/A |
| Position controller | Taiwan MF | MF7802 | HKE-011 | Jun. 17, 2021 |
| Radiated test software | Tonscend | TS+ Rev 2.5.0.0 | HKE-082 | N/A |
| RF cable (9KHz-1GHz) | Times | 381806-001 | N/A | N/A |
| RF cable | Times | 1-40G | HKE-034 | Jun. 17, 2021 |
| High gain antenna | Schwarzbeck | LB-180400K F | HKE-054 | Jun. 17, 2021 |

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).



Test Data

All the test modes completed for test. Only the worst result of AC 240V/60Hz (802.11b at 2412MHz) was reported as below:

Below 1GHz

FCC PART 15 C CLASS B 100 90 80 70 60 Level[dBµV/m] 50 M. W. W. Markow 40 William will be will 30 Ν 20 10 0└ 30M 100M 1G - QP Limit Frequency[Hz] • QP Detector

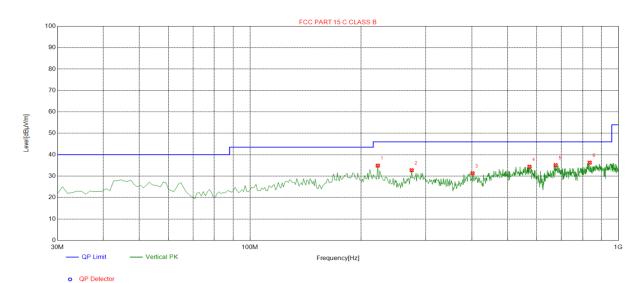
Horizontal

| Suspected List | | | | | | | | | |
|----------------|----------|--------|----------|----------|----------|--------|--------|-------|------------|
| NO. | Freq. | Factor | Reading | Level | Limit | Margin | Height | Angle | Polarity |
| NO. | [MHz] | [dB] | [dBµV/m] | [dBµV/m] | [dBµV/m] | [dB] | [cm] | [°] | Polanty |
| 1 | 41.6517 | -14.25 | 39.48 | 25.23 | 40.00 | 14.77 | 100 | 153 | Horizontal |
| 2 | 110.5906 | -15.53 | 45.09 | 29.56 | 43.50 | 13.94 | 100 | 25 | Horizontal |
| 3 | 210.6006 | -14.79 | 53.02 | 38.23 | 43.50 | 5.27 | 100 | 280 | Horizontal |
| 4 | 320.3203 | -12.08 | 52.18 | 40.10 | 46.00 | 5.90 | 100 | 360 | Horizontal |
| 5 | 446.5465 | -9.14 | 48.04 | 38.90 | 46.00 | 7.10 | 100 | 273 | Horizontal |
| 6 | 864.0641 | -2.37 | 44.66 | 42.29 | 46.00 | 3.71 | 100 | 225 | Horizontal |

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level;



Vertical



| Suspe | cted List | | | | | | | | |
|-------|-----------|--------|----------|----------|----------|--------|--------|-------|----------|
| NO. | Freq. | Factor | Reading | Level | Limit | Margin | Height | Angle | Delority |
| NO. | [MHz] | [dB] | [dBµV/m] | [dBµV/m] | [dBµV/m] | [dB] | [cm] | [°] | Polarity |
| 1 | 222.2523 | -14.51 | 49.42 | 34.91 | 46.00 | 11.09 | 100 | 182 | Vertical |
| 2 | 274.6847 | -13.47 | 46.21 | 32.74 | 46.00 | 13.26 | 100 | 185 | Vertical |
| 3 | 401.8819 | -10.37 | 41.72 | 31.35 | 46.00 | 14.65 | 100 | 175 | Vertical |
| 4 | 573.7437 | -6.47 | 40.85 | 34.38 | 46.00 | 11.62 | 100 | 50 | Vertical |
| 5 | 675.6957 | -4.75 | 39.89 | 35.14 | 46.00 | 10.86 | 100 | 114 | Vertical |
| 6 | 835.9059 | -2.51 | 38.80 | 36.29 | 46.00 | 9.71 | 100 | 316 | Vertical |

Remark: Factor = Cable loss + Antenna factor - Preamplifier; Level = Reading + Factor; Margin = Limit - Level;

Harmonics and Spurious Emissions

Frequency Range (9 kHz-30MHz)

| Frequency (MHz) | Level@3m (dBµV/m) | Limit@3m (dBµV/m) |
|-----------------|-------------------|-------------------|
| | | |
| | | |
| | | |
| | | |

Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement



Above 1GHz

RADIATED EMISSION TEST

LOW CH1 (802.11b Mode)/2412

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | | |
| 4824 | 57.29 | -3.64 | 53.65 | 74 | -20.35 | peak | | | |
| 4824 | 44.76 | -3.64 | 41.12 | 54 | -12.88 | AVG | | | |
| 7236 | 49.76 | -0.95 | 48.81 | 74 | -25.19 | peak | | | |
| 7236 | 39.23 | -0.95 | 38.28 | 54 | -15.72 | AVG | | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4824 | 61.36 | -3.64 | 57.72 | 74 | -16.28 | peak | | |
| 4824 | 46.54 | -3.64 | 42.9 | 54 | -11.1 | AVG | | |
| 7236 | 49.88 | -0.95 | 48.93 | 74 | -25.07 | peak | | |
| 7236 | 39.58 | -0.95 | 38.63 | 54 | -15.37 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



MID CH6 (802.11b Mode)/2437

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4874 | 59.09 | -3.51 | 55.58 | 74 | -18.42 | peak | | |
| 4874 | 44.18 | -3.51 | 40.67 | 54 | -13.33 | AVG | | |
| 7311 | 55.21 | -0.82 | 54.39 | 74 | -19.61 | peak | | |
| 7311 | 37.8 | -0.82 | 36.98 | 54 | -17.02 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4874 | 62.03 | -3.51 | 58.52 | 74 | -15.48 | peak | | |
| 4874 | 45.31 | -3.51 | 41.8 | 54 | -12.2 | AVG | | |
| 7311 | 56.69 | -0.82 | 55.87 | 74 | -18.13 | peak | | |
| 7311 | 39.98 | -0.82 | 39.16 | 54 | -14.84 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



HIGH CH11 (802.11b Mode)/2462

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | | |
| 4924 | 59.38 | -3.43 | 55.95 | 74 | -18.05 | peak | | | |
| 4924 | 38.7 | -3.43 | 35.27 | 54 | -18.73 | AVG | | | |
| 7386 | 52 | -0.75 | 51.25 | 74 | -22.75 | peak | | | |
| 7386 | 40.28 | -0.75 | 39.53 | 54 | -14.47 | AVG | | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | | |

Vertical:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector |
|-----------|----------------|--------|----------------|----------|--------|----------|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре |
| 4924 | 59.02 | -3.43 | 55.59 | 74 | -18.41 | peak |
| 4924 | 45.89 | -3.43 | 42.46 | 54 | -11.54 | AVG |
| 7386 | 47.82 | -0.75 | 47.07 | 74 | -26.93 | peak |
| 7386 | 40.02 | -0.75 | 39.27 | 54 | -14.73 | AVG |
| 7386 | - | -0.75 | - | | | |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

(1) Measuring frequencies from 1 GHz to the 25 GHz.

(2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.

(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4)The emissions are attenuated more than 20dB below the permissible limits are not recorded in the re port.

(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.



LOW CH1 (802.11g Mode)/2412

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4824 | 57.71 | -3.64 | 54.07 | 74 | -19.93 | peak | | |
| 4824 | 45.33 | -3.64 | 41.69 | 54 | -12.31 | AVG | | |
| 7236 | 50.06 | -0.95 | 49.11 | 74 | -24.89 | peak | | |
| 7236 | 38.94 | -0.95 | 37.99 | 54 | -16.01 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4824 | 52.58 | -3.64 | 48.94 | 74 | -25.06 | peak | | |
| 4824 | 41.57 | -3.64 | 37.93 | 54 | -16.07 | AVG | | |
| 7236 | 55.35 | -0.95 | 54.4 | 74 | -19.6 | peak | | |
| 7236 | 40.61 | -0.95 | 39.66 | 54 | -14.34 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



MID CH6 (802.11g Mode)/2437

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4874 | 56.70 | -3.51 | 53.19 | 74 | -20.81 | peak | | |
| 4874 | 40.78 | -3.51 | 37.27 | 54 | -16.73 | AVG | | |
| 7311 | 50.53 | -0.82 | 49.71 | 74 | -24.29 | peak | | |
| 7311 | 38.45 | -0.82 | 37.63 | 54 | -16.37 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4874 | 56.16 | -3.51 | 52.65 | 74 | -21.35 | peak | | |
| 4874 | 42.49 | -3.51 | 38.98 | 54 | -15.02 | AVG | | |
| 7311 | 53.8 | -0.82 | 52.98 | 74 | -21.02 | peak | | |
| 7311 | 38.58 | -0.82 | 37.76 | 54 | -16.24 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



HIGH CH11 (802.11g Mode)/2462

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | | |
| 4924 | 60.23 | -3.43 | 56.8 | 74 | -17.2 | peak | | | |
| 4924 | 43.97 | -3.43 | 40.54 | 54 | -13.46 | AVG | | | |
| 7386 | 53.6 | -0.75 | 52.85 | 74 | -21.15 | peak | | | |
| 7386 | 39.68 | -0.75 | 38.93 | 54 | -15.07 | AVG | | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | | |

Vertical:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | | |
| 4924 | 52.36 | -3.43 | 48.93 | 74 | -25.07 | peak | | | |
| 4924 | 41.96 | -3.43 | 38.53 | 54 | -15.47 | AVG | | | |
| 7386 | 48.2 | -0.75 | 47.45 | 74 | -26.55 | peak | | | |
| 7386 | 36.5 | -0.75 | 35.75 | 54 | -18.25 | AVG | | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | | |

Remark:

(1) Measuring frequencies from 1 GHz to the 25 GHz.

(2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.

(3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.

(4) The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.

(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.



LOW CH1 (802.11n/H20 Mode)/2412

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4824 | 60.01 | -3.64 | 56.37 | 74 | -17.63 | peak | | |
| 4824 | 39.90 | -3.64 | 36.26 | 54 | -17.74 | AVG | | |
| 7236 | 53.48 | -0.95 | 52.53 | 74 | -21.47 | peak | | |
| 7236 | 36.86 | -0.95 | 35.91 | 54 | -18.09 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4824 | 58.86 | -3.64 | 55.22 | 74 | -18.78 | peak | | |
| 4824 | 43.43 | -3.64 | 39.79 | 54 | -14.21 | AVG | | |
| 7236 | 49.28 | -0.95 | 48.33 | 74 | -25.67 | peak | | |
| 7236 | 40.3 | -0.95 | 39.35 | 54 | -14.65 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



MID CH6 (802.11n/H20 Mode)/2437

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4874 | 54.13 | -3.51 | 50.62 | 74.00 | -23.38 | peak | | |
| 4874 | 44.47 | -3.51 | 40.96 | 54.00 | -13.04 | AVG | | |
| 7311 | 50.29 | -0.82 | 49.47 | 74.00 | -24.53 | peak | | |
| 7311 | 43.04 | -0.82 | 42.22 | 54.00 | -11.78 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector | | |
|----------------|---|--------|----------------|----------|--------|----------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Туре | | |
| 4874 | 58.86 | -3.51 | 55.35 | 74.00 | -18.65 | peak | | |
| 4874 | 42.78 | -3.51 | 39.27 | 54.00 | -14.73 | AVG | | |
| 7311 | 50.70 | -0.82 | 49.88 | 74.00 | -24.12 | peak | | |
| 7311 | 33.47 | -0.82 | 32.65 | 54.00 | -21.35 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



HIGH CH11 (802.11n/H20 Mode)/2462

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4924 | 56.48 | -3.43 | 53.05 | 74 | -20.95 | peak | | |
| 4924 | 42.18 | -3.43 | 38.75 | 54 | -15.25 | AVG | | |
| 7386 | 51.36 | -0.75 | 50.61 | 74 | -23.39 | peak | | |
| 7386 | 36.36 | -0.75 | 35.61 | 54 | -18.39 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4924 | 59.4 | -3.43 | 55.97 | 74 | -18.03 | peak | | |
| 4924 | 42.1 | -3.43 | 38.67 | 54 | -15.33 | AVG | | |
| 7386 | 54.38 | -0.75 | 53.63 | 74 | -20.37 | peak | | |
| 7386 | 38.98 | -0.75 | 38.23 | 54 | -15.77 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

LOW CH3 (802.11n/H40 Mode)/2422

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4844 | 61.35 | -3.63 | 57.72 | 74 | -16.28 | peak | | |
| 4844 | 40.78 | -3.63 | 37.15 | 54 | -16.85 | AVG | | |
| 7266 | 54.31 | -0.94 | 53.37 | 74 | -20.63 | peak | | |
| 7266 | 36.6 | -0.94 | 35.66 | 54 | -18.34 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4844 | 60.29 | -3.63 | 56.66 | 74 | -17.34 | peak | | |
| 4844 | 40.09 | -3.63 | 36.46 | 54 | -17.54 | AVG | | |
| 7266 | 53.27 | -0.94 | 52.33 | 74 | -21.67 | peak | | |
| 7266 | 32.99 | -0.94 | 32.05 | 54 | -21.95 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



MID CH6 (802.11n/H40 Mode)/2437

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4874 | 57.89 | -3.51 | 54.38 | 74 | -19.62 | peak | | |
| 4874 | 38.79 | -3.51 | 35.28 | 54 | -18.72 | AVG | | |
| 7311 | 54.3 | -0.82 | 53.48 | 74 | -20.52 | peak | | |
| 7311 | 35.64 | -0.82 | 34.82 | 54 | -19.18 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4874 | 61.07 | -3.51 | 57.56 | 74 | -16.44 | peak | | |
| 4874 | 44.57 | -3.51 | 41.06 | 54 | -12.94 | AVG | | |
| 7311 | 49.91 | -0.82 | 49.09 | 74 | -24.91 | peak | | |
| 7311 | 40.74 | -0.82 | 39.92 | 54 | -14.08 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



HIGH CH9 (802.11n/H40 Mode)/2452

Horizontal:

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 4904 | 58.54 | -3.43 | 55.11 | 74 | -18.89 | peak | | |
| 4904 | 43.62 | -3.43 | 40.19 | 54 | -13.81 | AVG | | |
| 7356 | 50.86 | -0.75 | 50.11 | 74 | -23.89 | peak | | |
| 7356 | 38.79 | -0.75 | 38.04 | 54 | -15.96 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

Vertical:

| Reading Result | Factor | Emission Level | Limits | Margin | Detector Type |
|----------------|-----------------------------------|---|--|--|--|
| (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | регестог туре |
| 59.17 | -3.43 | 55.74 | 74 | -18.26 | peak |
| 37.22 | -3.43 | 33.79 | 54 | -20.21 | AVG |
| 52.68 | -0.75 | 51.93 | 74 | -22.07 | peak |
| 41.91 | -0.75 | 41.16 | 54 | -12.84 | AVG |
| | (dBµV) 59.17 37.22 52.68 | (dBµV) (dB) 59.17 -3.43 37.22 -3.43 52.68 -0.75 | (dBµV) (dB) (dBµV/m) 59.17 -3.43 55.74 37.22 -3.43 33.79 52.68 -0.75 51.93 | (dBµV) (dB) (dBµV/m) (dBµV/m) 59.17 -3.43 55.74 74 37.22 -3.43 33.79 54 52.68 -0.75 51.93 74 | (dBµV) (dB) (dBµV/m) (dBµV/m) (dBµV/m) 59.17 -3.43 55.74 74 -18.26 37.22 -3.43 33.79 54 -20.21 52.68 -0.75 51.93 74 -22.07 |

Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Remark:

(1) Measuring frequencies from 1 GHz to the 25 GHz.

(2) "F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency.
 (3) * denotes emission frequency which appearing within the Restricted Bands specified in provision of

15.205, then the general radiated emission limits in 15.209 apply.

(4))The emissions are attenuated more than 20dB below the permissible limits are not recorded in the report.

(5) The IF bandwidth of EMI Test Receiver between 30MHz to 1GHz was 120KHz, 1 MHz for measuring above 1 GHz, below 30MHz was 10KHz.

(6) When the test results of Peak Detected below the limits of Average Detected, the Average Detected is not need completed. For example: Top Channel at Fundamental 73.16dBuV/m(PK Value) <93.98(AV Limit), at harmonic 53.20 dBuV/m(PK Value) <54 dBuV/m(AV Limit), the Average Detected not need to completed.



Test Result of Radiated Spurious at Band edges

Operation Mode: 802.11b Mode TX CH Low (2412MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2310.00 | 58.47 | -5.81 | 52.66 | 74 | -21.34 | peak | | |
| 2310.00 | / | -5.81 | / | 54 | / | AVG | | |
| 2390.00 | 63.58 | -5.84 | 57.74 | 74 | -16.26 | peak | | |
| 2390.00 | 46.55 | -5.84 | 40.71 | 54 | -13.29 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2310.00 | 59.07 | -5.81 | 53.26 | 74 | -20.74 | peak | | |
| 2310.00 | / | -5.81 | 1 | 54 | 1 | AVG | | |
| 2390.00 | 67.36 | -5.84 | 61.52 | 74 | -12.48 | peak | | |
| 2390.00 | 46.21 | -5.84 | 40.37 | 54 | -13.63 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



Operation Mode: TX CH High (2462MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 59.22 | -5.81 | 53.41 | 74 | -20.59 | peak | | |
| 2483.50 | 1 | -5.81 | 1 | 54 | 1 | AVG | | |
| 2500.00 | 58.36 | -6.06 | 52.3 | 74 | -21.7 | peak | | |
| 2500.00 | 1 | -6.06 | 1 | 54 | 1 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|---|--|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 58.02 | -5.81 | 52.21 | 74 | -21.79 | peak | | |
| 2483.50 | 1 | -5.81 | / | 54 | 1 | AVG | | |
| 2500.00 | 59.31 | -6.06 | 53.25 | 74 | -20.75 | peak | | |
| 2500.00 | / | -6.06 | / | 54 | 1 | AVG | | |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | | |
| Remark: All the | Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit. | | | | | | | |



Operation Mode: 802.11g Mode TX CH Low (2412MHz)

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Deleciol Type | | |
| 2310.00 | 57.47 | -5.81 | 51.66 | 74 | -22.34 | peak | | |
| 2310.00 | / | -5.81 | / | 54 | 1 | AVG | | |
| 2390.00 | 65.23 | -5.84 | 59.39 | 74 | -14.61 | peak | | |
| 2390.00 | 49.86 | -5.84 | 44.02 | 54 | -9.98 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delecior Type | | |
| 2310.00 | 59.16 | -5.81 | 53.35 | 74 | -20.65 | peak | | |
| 2310.00 | 1 | -5.81 | 1 | 54 | 1 | AVG | | |
| 2390.00 | 64.55 | -5.84 | 58.71 | 74 | -15.29 | peak | | |
| 2390.00 | 49.86 | -5.84 | 44.02 | 54 | -9.98 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



Operation Mode: TX CH High (2462MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 58.77 | -5.65 | 53.12 | 74 | -20.88 | peak | | |
| 2483.50 | 1 | -5.65 | 1 | 54 | 1 | AVG | | |
| 2500.00 | 58.69 | -5.65 | 53.04 | 74 | -20.96 | peak | | |
| 2500.00 | 1 | -5.65 | 1 | 54 | / | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|-----------------|--|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 58.02 | -5.65 | 52.37 | 74 | -21.63 | peak | | |
| 2483.50 | / | -5.65 | / | 54 | / | AVG | | |
| 2500.00 | 59.12 | -5.65 | 53.47 | 74 | -20.53 | peak | | |
| 2500.00 | / | -5.65 | 1 | 54 | / | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |
| Remark: All the | Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit. | | | | | | | |



Operation Mode: 802.11n/H20 Mode TX CH Low (2412MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2310.00 | 57.06 | -5.81 | 51.25 | 74 | -22.75 | peak | | |
| 2310.00 | 1 | -5.81 | / | 54 | 1 | AVG | | |
| 2390.00 | 66.39 | -5.84 | 60.55 | 74 | -13.45 | peak | | |
| 2390.00 | 46.85 | -5.84 | 41.01 | 54 | -12.99 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2310.00 | 59.55 | -5.81 | 53.74 | 74 | -20.26 | peak | | |
| 2310.00 | 1 | -5.81 | / | 54 | / | AVG | | |
| 2390.00 | 65.32 | -5.84 | 59.48 | 74 | -14.52 | peak | | |
| 2390.00 | 47.85 | -5.84 | 42.01 | 54 | -11.99 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



Operation Mode: TX CH High (2462MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 59.25 | -5.65 | 53.6 | 74 | -20.4 | peak | | |
| 2483.50 | 1 | -5.65 | 1 | 54 | 1 | AVG | | |
| 2500.00 | 57.49 | -5.65 | 51.84 | 74 | -22.16 | peak | | |
| 2500.00 | 1 | -5.65 | 1 | 54 | 1 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|---|--|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 57.33 | -5.65 | 51.68 | 74 | -22.32 | peak | | |
| 2483.50 | 1 | -5.65 | / | 54 | 1 | AVG | | |
| 2500.00 | 58.46 | -5.65 | 52.81 | 74 | -21.19 | peak | | |
| 2500.00 | 1 | -5.65 | 1 | 54 | 1 | AVG | | |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | | |
| Remark: All the | Remark: All the other emissions not reported were too low to read and deemed to comply with FCC limit. | | | | | | | |



Operation Mode: 802.11n/H40 Mode TX CH Low (2422MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2310.00 | 57.74 | -5.81 | 51.93 | 74 | -22.07 | peak | | |
| 2310.00 | / | -5.81 | / | 54 | 1 | AVG | | |
| 2390.00 | 63.28 | -5.84 | 57.44 | 74 | -16.56 | peak | | |
| 2390.00 | 49.77 | -5.84 | 43.93 | 54 | -10.07 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delecior Type | | |
| 2310.00 | 56.69 | -5.81 | 50.88 | 74 | -23.12 | peak | | |
| 2310.00 | 1 | -5.81 | / | 54 | 1 | AVG | | |
| 2390.00 | 64.58 | -5.84 | 58.74 | 74 | -15.26 | peak | | |
| 2390.00 | 49.77 | -5.84 | 43.93 | 54 | -10.07 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |



Operation Mode: TX CH High (2452MHz)

Horizontal

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | | |
|----------------|---|--------|----------------|----------|--------|---------------|--|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | | |
| 2483.50 | 57.74 | -5.65 | 52.09 | 74 | -21.91 | peak | | |
| 2483.50 | 1 | -5.65 | 1 | 54 | 1 | AVG | | |
| 2500.00 | 58.86 | -5.65 | 53.21 | 74 | -20.79 | peak | | |
| 2500.00 | 1 | -5.65 | 1 | 54 | 1 | AVG | | |
| Remark: Factor | Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |

| Frequency | Reading Result | Factor | Emission Level | Limits | Margin | Detector Type | |
|---|-------------------|------------------|---------------------|----------------|----------------|---------------|--|
| (MHz) | (dBµV) | (dB) | (dBµV/m) | (dBµV/m) | (dB) | Delector Type | |
| 2483.50 | 57.15 | -5.65 | 51.5 | 74 | -22.5 | peak | |
| 2483.50 | 1 | -5.65 | 1 | 54 | 1 | AVG | |
| 2500.00 | 56.34 | -5.65 | 50.69 | 74 | -23.31 | peak | |
| 2500.00 | / | -5.65 | 1 | 54 | 1 | AVG | |
| Remark: Factor = Antenna Factor + Cable Loss – Pre-amplifier. | | | | | | | |
| Remark: All the | other emissions n | ot reported were | e too low to read a | nd deemed to c | omply with FCC | ; limit. | |



4.7. ANTENNA REQUIREMENT

Standard Applicable

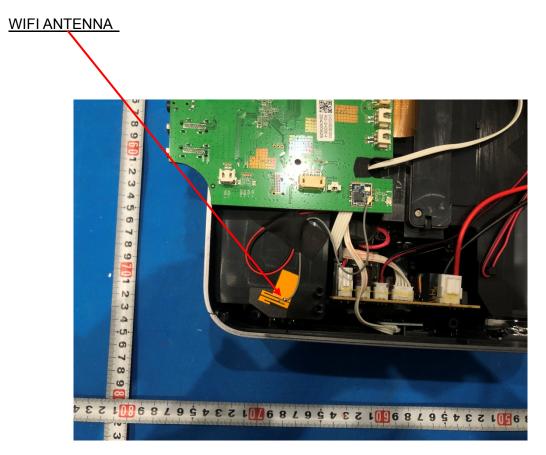
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247, if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

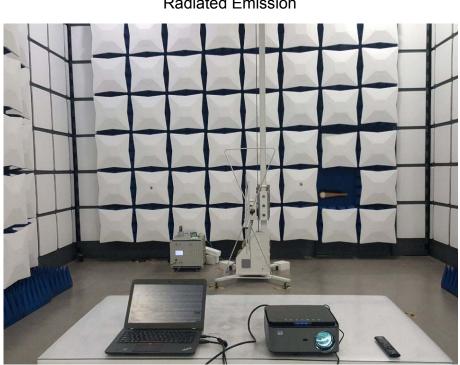
Antenna Connected Construction

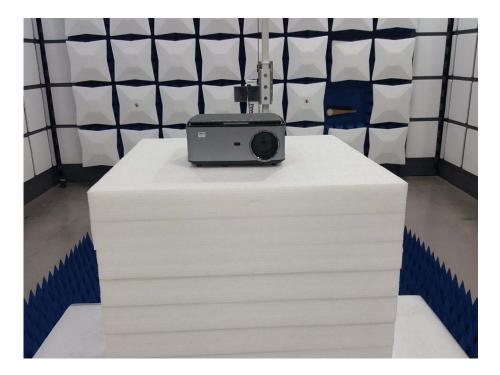
The antenna used in this product is a Internal Antenna, need professional installation, not easy to remove. It conforms to the standard requirements. The directional gains of antenna used for transmitting is 1dBi.





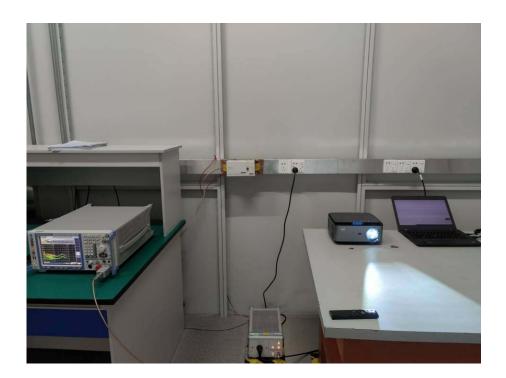
4.8. PHOTOGRAPH OF TEST





Radiated Emission







4.9. PHOTOS OF THE EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos

-----End of test report------